

WHAT IS CLAIMED IS:

1. An apparatus for drawing a wire having a first diameter to provide a metallic fiber having a reduced second diameter, comprising:
 - a feed mechanism for moving the wire at a first linear velocity;
 - a laser beam for heating a region of the wire; and
 - a draw mechanism for drawing said heated wire at a second linear velocity for providing a metallic fiber having a second diameter.
2. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said second linear velocity is greater than said first linear velocity.
3. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said feed and said draw mechanism comprises a feed capstan drive and a draw capstan drive, respectively.
4. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said laser beam heats a region of the wire to a visco-elastic temperature.
5. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said laser beam comprises a laser for generating a laser output beam; and
 - a beam splitter for dividing said laser output beam into a first laser beam and a second laser beam for impinging upon a first and a second side of the wire.

6. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said laser beam has a first diameter that is greater than a diameter of the wire;

a lens for focusing a first portion of said laser beam onto a first side of the wire with a second portion of said laser beam passing along side of the wire; and

a reflector for directing said second portion of said laser beam onto a second side of the wire.

7. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said laser beam comprises has a first diameter that is at least 1.42 times a diameter of the wire;

a lens for focusing a first portion of said laser beam onto a first side of the wire with a second portion of said laser beam passing along side of the wire; and

a reflector for directing said second portion of said laser beam onto a second side of the wire.

8. An apparatus for drawing a metallic fiber as set forth in claim 1, including a fluid for enveloping said heated region of said wire.

9. An apparatus for drawing a metallic fiber as set forth in claim 1, including an annealing oven for annealing the metallic fiber.

10. An apparatus for drawing a metallic fiber as set forth in claim 1, wherein said feed mechanism comprises a feed capstan drive for feeding the wire said first linear velocity;

said draw mechanism comprising a draw capstan drive for drawing the metallic

fiber at said second linear velocity; and

said second linear velocity being greater than said first linear velocity for drawing the wire into the metallic fiber in the heated region of the wire.

11. An apparatus for drawing a wire having a first diameter to provide a metallic fiber having a reduced second diameter, comprising:

a feed spool containing the wire;

a feed mechanism comprising a feed capstan drive for moving the wire from said feed spool at a first linear velocity;

chamber having an inert atmosphere for enveloping the wire;

a laser beam for heating a region of the wire within said chamber;

a draw mechanism comprising a draw capstan drive for drawing said heated wire at a second linear velocity for providing the metallic fiber having a second diameter; and

a take up spool for receiving the drawn metallic fiber.

12. An apparatus for drawing a metallic fiber as set forth in claim 11 wherein said chamber has an entry groove and an exit groove with the wire entering said chamber through said entry groove and with said drawn metallic fiber exiting said chamber through said exit groove; and

said chamber having a fluid inlet port for receiving a pressurized fluid atmosphere for enveloping the wire; and

said pressurized fluid atmosphere exiting said entry groove and said exit groove for providing a fluid bearing for said wire within said entry groove and for providing a fluid bearing for said drawn metallic fiber within said exit groove.

13. An apparatus for drawing a metallic fiber as set forth in claim 11 wherein said chamber has an entry groove and an exit groove with the wire entering said chamber through said entry groove and with said drawn metallic fiber exiting said chamber through said exit groove; and

said chamber having a fluid inlet port for receiving a pressurized fluid atmosphere for enveloping the wire; and

said pressurized fluid atmosphere exiting said exit groove for cooling the drawn metallic fiber.

14. An apparatus for drawing a metallic fiber as set forth in claim 11 wherein said chamber has an entry groove and an exit groove with the wire entering said chamber through said entry groove and with said drawn metallic fiber exiting said chamber through said exit groove; and

said chamber having a window substantially transparent to said laser beam for heating said region of the wire within said chamber.

15. An apparatus for drawing a metallic fiber as set forth in claim 11, including a cooling chamber receiving a fluid for enveloping the drawn metallic fiber having the reduced second diameter for cooling the drawn metallic fiber.

16. An apparatus for drawing a metallic fiber as set forth in claim 11, wherein the wire is a composite wire having an inner wire component and an outer wire component.

17. An apparatus for drawing a metallic fiber as set forth in claim 11, including an annealing

oven for annealing the drawn metallic fiber.

18. An apparatus for drawing a metallic fiber as set forth in claim 11, including a control module for controlling said first linear velocity and said second linear velocity for controlling the reduction of said second diameter from said first diameter.

19. An apparatus for drawing a metallic fiber as set forth in claim 11, including a first sensor and a second sensor for sensing said first diameter of said wire and said second diameter of said metallic fiber; and

a control module connected to said first and second sensors for controlling said first linear velocity and said second linear velocity for controlling the reduction of said second diameter from said first diameter.

20. An apparatus for drawing a metallic fiber as set forth in claim 11, including a first sensor and a second sensor for sensing said first diameter of said wire and said second diameter of said metallic fiber; and

a control module connected to said first and second sensors for controlling said first linear velocity and said second linear velocity and said laser for controlling the reduction of said second diameter from said first diameter.

21. A method of drawing a wire having a first diameter to a metallic fiber having a second diameter, comprising the steps of:

feeding the wire at a first linear velocity;

heating a region of the wire with a laser; and

drawing the wire at second linear velocity to produce the metallic fiber having a reduced second diameter.

22. A method of drawing a gold wire having a first diameter to a gold metallic fiber having a second diameter, comprising the steps of:

feeding the gold wire at a first linear velocity;

heating a region of the gold wire with a laser; and

drawing the gold wire at second linear velocity to produce the gold metallic fiber having a reduced second diameter.

23. A method of drawing a gold wire as set forth in claim 22, wherein the step of feeding the gold wire includes feeding the gold wire having the first diameter of approximately one hundred microns.

the step of drawing the gold wire includes drawing the gold wire to have the second diameter of approximately twenty-five microns; and

24. A method of drawing a composite wire having an inner wire component and outer wire component defining a first diameter to a metallic fiber alloy having a second diameter, comprising the steps of:

feeding the composite wire at a first linear velocity;

heating a region of the composite wire with a laser for softening the composite wire and for diffusing the outer wire component into the inner wire component; and

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drawing the composite wire at second linear velocity to produce the metallic alloy fiber having a reduced second diameter.